Answer to the rhythm puzzle

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The ECG in Fig. 1 shows a broad complex tachycardia of approximately 150 beats/min, a QRS duration of 145 msec with a right bundle branch block and a right electrical axis.

The differential diagnosis of broad complex tachycardia includes ventricular tachycardia (VT), supraventricular tachycardia (SVT) with aberrancy or underlying bundle branch block and antegrade SVT conduction over an accessory pathway (antidromic SVT) [1]. Ventricular tachycardia is usually the result of re-entry and most commonly arises in an area of diseased myocardium in the setting of previous myocardial infarction or cardiomyopathy, but can also occur in patients with structurally

normal hearts [1]. In case of broad complex tachycardia well-known electrocardiographic criteria, the presence of structural heart disease or a history of previous myocardial infarction, ineffectiveness of intravenous adenosine, cardioversion with low energy and AV dissociation are used to diagnose VT rather than SVT [2–6].

In our patient electrocardiographic criteria (QRS duration >140 msec, monophasic R in V1, R/S <1 in V6), structural heart disease (cardiomegaly on the chest X-ray), the effect of adenosine and successful cardioversion with 10 W argue in favour of VT.

In order to detect structural heart disease, transthoracic echocardiography (TTE) and coronary angiography were

Fig. 1 ECG on admission

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performed. TTE revealed a dilated left ventricle with impaired left ventricle function (ejection fraction between 35 and 40%) and central mild mitral insufficiency. Coronary angiography demonstrated significant two-vessel

Fig. 2 ECG after cardioversion

disease of the ramus descendens anterior and the marginalis obtusus. Thereupon percutaneous coronary intervention was performed. However, the abnormalities as shown in Fig. 2 remained present. What is your diagnosis considering Fig. 2?

The ECG in Fig. 2 shows a regular rhythm of approximately 90 beats/min, a relatively narrow QRS complex (duration 110 msec) with an RBBB configuration and right-axis deviation, findings which are typical of left anterior fascicular VT [7]. AV dissociation is present

Fig. 3 AV dissociation indicated by arrows

with an atrial frequency of 55 beats/min (Fig. 3). Electrophysiological examination was performed which demonstrated an AV block with subnodal conduction delay and a fascicular rhythm stemming from the left anterior fascicle. Thereupon, a dual chamber pacemaker was implanted successfully. Moreover, because of the combination of a depressed left ventricular systolic function and since fascicular VT tends to respond to β -blocker therapy, metoprolol was started to treat symptoms of heart failure and to prevent recurrence of the fascicular tachycardia.

In conclusion, the patient presented with VT. However, after termination of the VT by cardioversion sinus node disease, AV nodal block and a left anterior fascicular VT became apparent. The combination of these phenomena is unusual, but as shown here not impossible in diseased hearts.

References

1. Sager PT, Bhandari AK. Wide complex tachycardias. Differential diagnosis and management. *Cardiol Clin*. 1991;9(4):595–618.
2. Brembilla-Perrot B, Beurrier D, Houriez P, et al. Wide QRS complex tachycardia. Rapid method of prognostic evaluation. *Int J Cardiol*. 2004;97(1):83–9.
3. Wright M, O'Neill MD, Wright I, et al. Broad complex tachycardia: a broad differential. *J Cardiovasc Electrophysiol*. 2008;19(2):217–8.
4. Janeira LF. Differentiating wide complex tachycardias. *Am Fam Physician*. 1996;54(5):1573–84.
5. Wellens HJ, Bar FW, Lie KI. The value of the electrocardiogram in the differential diagnosis of a tachycardia with a widened QRS complex. *Am J Med*. 1978;64:27–33.
6. Brugada P, Brugada J, Mont L, et al. A new approach to the differential diagnosis of a regular tachycardia with a wide QRS complex. *Circulation*. 1991;83:1649–59.
7. Nogami A. Idiopathic left ventricular tachycardia: assessment and treatment. *Card Electrophysiol Rev*. 2002;6:448–57.